

WHAT IS CLAIMED IS:

1. A magnetic random access memory comprising:
a write wiring constituted by at least one wiring;
a magnetic tunnel junction device which is
5 disposed closely to the write wiring and in which
information is written in accordance with an induced
magnetic flux generated by supplying a current to the
write wiring; and

a magnetic layer which is provided so as to cover
10 at least a part of a sidewall of the write wiring and
formed by grown columnar grains and in which the
growing direction of the columnar grains is 30° or less
from the normal-line direction of the sidewall.

2. The magnetic random access memory according to
15 claim 1, wherein the write wiring serves as a bit line.

3. The magnetic random access memory according to
claim 1, wherein the write wiring serves as a write
word line.

4. The magnetic random access memory according to
20 claim 1, wherein the write wiring serves as a bit line
and a write word line.

5. A magnetic random access memory comprising:
a write wiring constituted by at least one wiring;
a magnetic tunnel junction device which is
25 disposed closely to the write wiring and in which
information is written in accordance with an induced
magnetic flux generated by supplying a current to

the write wiring; and

a magnetic layer provided so as to cover at least a part of a sidewall of the write wiring and having a structure in which grains are deposited like a layer.

5 6. The magnetic random access memory according to claim 5, wherein the write wiring serves as a bit line.

7. The magnetic random access memory according to claim 5, wherein the write wiring serves as a write word line.

10 8. The magnetic random access memory according to claim 5, wherein the write wiring serves as a bit line and a write word line.

9. A magnetic random access memory comprising:

a write wiring constituted by at least one wiring;

15 a magnetic tunnel junction device which is disposed closely to the write wiring and in which information is written in accordance with an induced magnetic flux generated by supplying a current to the write wiring; and

20 a magnetic layer provided so as to cover at least a part of a sidewall of the write wiring and having a structure in which grains are amorphously deposited.

10. The magnetic random access memory according to claim 9, wherein the write wiring serves as a bit line.

25 11. The magnetic random access memory according to claim 9, wherein the write wiring serves as a write word line.

12. The magnetic random access memory according to claim 9, wherein the write wiring serves as a bit line and a write word line.

13. A magnetic random access memory comprising:

5 a write wiring constituted by at least one wiring;

a magnetic tunnel junction device which is disposed closely to the write wiring and in which information is written in accordance with an induced magnetic flux generated by supplying a current to the write wiring; and

10 a magnetic layer including at least two of the following three types such as a type which is provided so as to cover a part of a sidewall of the write wiring and constituted by grown columnar grains and in which the growing direction of the columnar grains is 30° or less from the normal-line direction of the sidewall, a type having a structure in which grains are deposited like a layer, and a type having a structure in which grains are amorphously deposited.

15 14. The magnetic random access memory according to claim 13, wherein the write wiring serves as a bit line.

15. The magnetic random access memory according to claim 13, wherein the write wiring serves as a write word line.

20 16. The magnetic random access memory according to claim 13, wherein the write wiring serves as a bit line and a write word line.

17. A method for manufacturing a magnetic random access memory on a semiconductor substrate having a write wiring constituted by at least one wiring and a magnetic tunnel junction device which is disposed
5 closely to the write wiring and in which information is written in accordance with an induced magnetic flux generated by supplying a current to the write wiring, the method comprising:

forming an insulating film on the semiconductor
10 substrate;

forming a trench in the insulating film;

depositing a magnetic body on the bottom face of the trench;

depositing a magnetic layer including at least
15 two of the following three types such as a type having a structure in which the growing direction of columnar grains is 30° or less from the normal-line direction of sidewalls of the trench, a type having a structure in which grains are deposited like a layer, and a type
20 having a structure in which grains are amorphously deposited, on the sidewalls of the trench; and

embedding the write wiring in the trench.

18. The method according to claim 17, wherein the write wiring serves as a write word line.

25 19. A method for manufacturing a magnetic random access memory on a semiconductor substrate having a write wiring constituted by at least one wiring and

a magnetic tunnel junction device which is disposed closely to the write wiring and in which information is written in accordance with an induced magnetic flux generated by supplying a current to the write wiring,
5 the method comprising:

forming an insulating film on the semiconductor substrate;

depositing a wiring material on the insulating film and forming the write wiring by patterning the wiring material, and
10

depositing a magnetic layer including at least two of the following three types such as a type having a structure in which the growing direction of columnar grains is 30° or less from the normal-line direction of sidewalls of the write wiring, a type having
15 a structure in which grains are deposited like a layer, and a type having a structure in which grains are amorphously deposited, on the write wiring by using a sputtering method.

20 20. The method according to claim 19, wherein the write wiring serves as a bit line.

21. A method for manufacturing a magnetic random access memory a semiconductor substrate having a write wiring constituted by at least one wiring and
25 a magnetic tunnel junction device which is disposed closely to the write wiring and in which information is written in accordance with an induced magnetic flux

generated by supplying a current to the write wiring on, the method comprising:

forming an insulating film on the semiconductor substrate;

5 forming a trench in the insulating film;

depositing a magnetic body on the bottom face of the trench;

depositing a magnetic layer including at least two of the following three types such as a type having
10 a structure in which the growing direction of columnar grains is 30° or less from the normal-line direction of sidewalls of the trench, a type having a structure in which grains are deposited like a layer, and a type having a structure in which grains are amorphously
15 deposited on the sidewalls of the trench by ionizing sputter grains of a magnetic body and flying the ionized supper grains onto the surface of the magnetic body on the bottom face of the trench; and
embedding the write wiring in the trench.

20 22. The method according to claim 21, wherein the write wiring serves as a write word line.

23. A method for manufacturing a magnetic random access memory on a semiconductor substrate having a write wiring constituted by at least one wiring and
25 a magnetic tunnel junction device which is disposed closely to the write wiring and in which information is written in accordance with an induced magnetic flux

generated by supplying a current to the write wiring,
the method comprising:

forming an insulating film on the semiconductor
substrate;

5 depositing a wiring material on the insulating
film and forming the write wiring by patterning the
wiring material; and

 depositing a magnetic layer including at least two
of the following three types such as a type having
10 a structure in which the growing direction of columnar
grains is 30° or less from the normal-line direction of
sidewalls of the write wiring, a type having
a structure in which grains are deposited like a layer,
and a type having a structure in which grains are
15 amorphously deposited on the write wiring.

24. The method according to claim 23, wherein the
write wiring serves as a bit line.

25. A method for manufacturing a magnetic random
access memory a semiconductor substrate having a write
20 wiring constituted by at least one wiring and
a magnetic tunnel junction device which is disposed
closely to the write wiring and in which information is
written in accordance with an induced magnetic flux
generated by supplying a current to the write wiring
25 on, the method comprising:

forming an insulating film on the semiconductor
substrate;

forming a trench in the insulating film;

forming a seed layer on sidewalls of the trench;

forming a magnetic layer including at least two of
the following types such as a type having a structure
5 in which the growing direction of columnar grains is
30° or less from the normal-direction of the sidewalls
of the trench, a type having a structure in which
grains are deposited like a layer, and a type having
a structure in which grains are amorphously deposited
10 on the inner periphery of the trench by growing the
magnetic layer from the seed layer in accordance with
a plating method; and

embedding the write wiring in the trench.

26. The method according to claim 25, wherein
15 an NiFe layer is used as the seed layer.

27. The method according to claim 25, wherein a Cu
layer is used as the seed layer.

28. The method according to claim 25, wherein the
write wiring serves as a write word line.

20 29. A method for manufacturing a magnetic random
access memory on a semiconductor substrate having
a write wiring constituted by at least one wiring and
a magnetic tunnel junction device which is disposed
closely to the write wiring and in which information is
25 written in accordance with an induced magnetic flux
generated by supplying a current to the write wiring,
the method comprising:

forming an insulating film on the semiconductor substrate;

depositing a wiring material mainly containing Cu on the insulating film and forming the write wiring by patterning the wiring material; and

growing a magnetic layer on the write wiring through a plating method such that the growing direction of columnar grains is 30° or less from the normal-line direction of sidewalls of the write wiring, a structure is provided in which grains are deposited like a layer, or a structure is provided in which grains are amorphously deposited.

30. The method according to claim 29, wherein the write wiring serves as a bit line.